Scaling Smart: The Best Hosting Server Types for Multi-User Projects – Prof Dux as a use Case

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ABSTRACT

The demand for scalable, efficient, and cost-effective hosting solutions is critical for multi-user applications due to existing issues that affect the efficient satisfaction and suitability implementation. This article evaluates different hosting server types—shared, virtual private servers (VPS), dedicated, and cloud hosting—analyzing their pros and cons in suitability for multi-user environments through comparative analysis from existing users projects. Our approach stated the best hosting solution considering scalability performance, cost efficiency and security as proposed solution to adaptive personalize education learning platform – Prof Dux as case study for scalable performance. More so, this analysis provide an insight to assist business and developer when making and informed decisions on hosting application for multiple users.

Keywords: Hosting, server. Cloud. Dedicated server. Shared server. AWS, Google cloud, Prof Dux

INTRODUCTION

A variety of real-time web approaches have been developed to address the issue of giving users changes as they happen on the server. These methods, which are predicated on the means of communication between the client and server, adhere to a number of ideas for providing such a service (Aziz, 2019). Multi-user applications, such as e-learning platforms, social media sites, and collaborative tools, require robust hosting solutions to ensure seamless functionality. One significant development that enables more adaptability and responsiveness is the rise of flexible and networked leadership structures.

By maximizing resource allocation and facilitating more effective decision-making, organizations that successfully use digital technology get a competitive advantage. However, managing the difficulties brought about by globalization is still a worry since firms need to combine regional adaptability with centralized management (Ma & Ye, 2015)

Selecting an appropriate hosting server impacts system reliability, security, and scalability

This article explores different hosting options and their effectiveness for multi-user projects that attain more effective real-time client-server communication, but there are problems that limit their applicability and user satisfaction for an implementation.

LITERTATURE REVIEW

This section discussed about several existing research that provide insight into other edge-assisted mobile apps, considering the diverse array of use cases for mobile edge computing, dwelling into their pros and drawback. the author of this study examined shared, virtual private servers (VPS), dedicated, and cloud hosting for multiple users setup , a proof-of-concept was created , and its shown that, in the case of an overloaded edge server, it can achieve both a considerable decrease in AR latency and high object-recognition accuracy (Aziz, 2019).

Recently, discussed the advancement of containerization and serve less computing. Further shift hosting paradigms towards more flexible solution. Studies explore hosting server types and their application to various projects by explore cloud hosting's elasticity and cost-effectiveness in handling dynamic workloads (Aziz, 2019). Multi user always experience low traffic which make it unsuitable for the users , highlight hosting that’s offers affordability but lacks performance scalability (Vachhani et al., 2024). VPS hosting provides a middle ground between shared and dedicated hosting, offering resource allocation at a moderate cost (Almurayh, n.d.)

METHODOLOGY

In this chapter, a comparative analysis was conducted on different types of hosting server using key performance indicators (KPIs) such as latency, cost efficiency, uptime , security and

scalability. The data's are gathered through case studies of exiting multi0user platform and benchmarking reports from industry such as Google cloud. Microsoft Azure and AWS.

Case study: Uses single server to each user division (Dedicated server). (Gonzalez & Wang, 2017)

Pros:

- No concerns about server capacity or resource competition.
- Each school has full control over its own server.
- Dedicated resources often exhibit high performance.

Cons:

- High upfront costs for hardware and maintenance.
- Increased complexity in terms of management, updates, and security.
- Potential for inconsistent configurations.

Case study: Use a single server for multiple users division (Shared server). (Almurayh, n.d.)

Pros:

- Reduced hardware costs.
- Simplified management and updates.
- Potential for consistent configurations.

Cons:

- Risk of server overload or resource competition.
- Security concerns if one school's issues affect others.
- Potential for performance degradation due to resource sharing.

Case study: Use a middle ground server between dedicated server and shared server (Virtual private servers) (Lee & Kim, 2020)

Pros:

- Its cost effective for medium sized applications and also scalable
- VPS has better customization and greater control that share hosting
- Due to its isolated resources , its more secure and offers better performance

Cons:

- Its resources are limited in comparison to dedicated server
- Required technical expertise for some level of server management

Case study: Use a Cloud hosting server (Miller, 2022).

Pros:

- It ensure high availability due to its redundant architecture
- Very flexible and scalable
- Cost efficiency such as Pay-as-you-go

Cons:

- It requires knowledge of configuration on cloud space
- Cost is not fixed, as it depend on the services provider and resources

RESULT

This section entails about the outcome of this research its was suggested that Shared hosting is unsuitable due to resource limitations, while VPS offers a viable alternative for medium-scale

applications, while dedicated servers remain relevant for high-security projects, and cloud hosting provides the best balance of scalability, performance, and cost efficiency for multi-user applications [18] [19].

How other companies handle similar situations:

Many web hosting companies and cloud service providers offer scalable solutions to handle the needs of multiple clients. Some common approaches include [20][21]:

Cloud Hosting: When resources are needed, cloud hosting enables website and application operators to add or delete them. This covers additional RAM, storage capacity, or auxiliary services like data storage or security. Cloud hosting offers affordability, flexibility, and dependability. Unlike dedicated or shared hosting on a single server, cloud hosting also offers reliable data backup and disaster recovery (*What Is Cloud Hosting? Benefits and Risks | Google Cloud*, n.d.) [22] [23].

Services like Google Cloud Platform as shown in figure 1 or AWS (Amazon Web Services) as shown in figure 2 provide scalable resources and managed services to handle high traffic and demands.

Figure 1: like Google Cloud Platform

Figure 2: AWS (Amazon Web Services)

Containerization and Orchestration: Companies like Kubernetes or Red Hat OpenShift use containerization and orchestration to manage and scale resources more efficiently.

1. Containerization: It involves combining the application code with the necessary packages and libraries needed at runtime so that the program can operate efficiently and dependably in any supported computing environment. Everything required to run an application is included in the bundle or container, including the code, runtime, system tools, system libraries, settings, and more. Also known as a container image [24][25].

2. Orchestration: It all comes down to managing container lifecycles, particularly in expansive, dynamic environments. Numerous tasks can be controlled and automated with it.

Container deployment and provisioning : Container availability and redundancy for Increasing or decreasing the number of containers to distribute the application load uniformly throughout the host infrastructure, Transferring containers between hosts in the event that a host runs out of resources or passes away. Resource distribution among containers services operating in a container are exposed to the external environment. Service discovery load balancing between some containers orchestration platforms, like Docker Swarm or Kubernetes, offer a simple way to specify the configuration of your application in a YAML or JSON file, depending on the tool,

1. Multi-Tenancy: Some hosting companies implement multi-tenancy solutions, where multiple clients share a single infrastructure while maintaining isolation and security.

   A single instance of a software program can serve numerous clients under a multi-tenancy architecture. Every client is referred to as a renter. Although they cannot alter the application's code, tenants may be allowed to change certain aspects of it, such as the user interface's color or the business rules.

   A shared environment is used by several instances of an application in a multi-tenant architecture. Because each tenant is logically distinct yet physically integrated, this architecture can function. This implies that a single instance of the program will serve several tenants on a single server. A dedicated instance of configurations, data, user management, and other properties can be shared by a software program in a multi-tenant architecture in this manner (*What Is Multi-Tenancy (Multi-Tenant Architecture)?*, n.d.).

2. Multi-tenant SaaS Architecture: One application serves multiple schools with data separation (*What Is SaaS Architecture? 10 Best Practices In 2024*, n.d.).

   Software as a Service, or SaaS, is a contemporary method of providing large, scalable enterprise software online. Scalability, availability, and utility computing for Internet services are offered via cloud computing platforms. The creation of SaaS involves numerous technical difficulties. One of these is multi-tenancy, which enables a single

software instance to support numerous businesses by simultaneously configuring it to meet each one's specific needs. For SaaS architecture to reach a higher maturity model, both configuration and some degree of customization are necessary (Aghera et al., 2012). https://ieeexplore.ieee.org/abstract/document/6200688

3. **Content Delivery Network (CDN):** To improve website speed globally. Reducing latency, or the communication lag brought on by a network's architecture, is the main goal of a content delivery network (CDN). Communication traffic between websites (servers) and their users (clients) must travel over great physical distances due to the internet's global and intricate structure. Additionally, the connection is two-way; the client sends requests to the server, and the server responds (*What Is a Content Delivery Network (CDN)? | How Do CDNs Work? | Cloudflare*, n.d.).

   By placing intermediary servers between the client and the website server, a CDN increases efficiency. Some of the client-server communications are controlled by these CDN servers. They enhance the user experience of your apps, lower bandwidth usage, and lessen web traffic to the web server (Peng, 2004).
4. Load Balancing: Distributing traffic to avoid overloading a single server. Load balancers, both cloud-based and software-based, aid in equitably allocating Internet traffic among the servers hosting the application. Global server load balancing (GSLB) is a technique used by some cloud load balancing providers to distribute Internet traffic loads among servers located all over the world (*Managed Cloud Hosting | 4X More Speed | 99.9% Uptime*, n.d.).

CONCLUSION

To choose the right hosting server for multi user application requires a crucial decision, in which some factors must be put into consideration for efficient performance, cost, security and scalability for Prof Dux personalize adaptive E-learning platform, due to increase in the number of users ranging from different departments and faculties from the university. This propose solution tend to explore different types of hosting server. Dedicated servers remain the preferred choice for enterprises that demand the highest security and performance levels, albeit at a higher cost. Shared hosting, while affordable, is not suitable for multi-user projects due to its limited resources and

scalability constraints. Cloud hosting emerges as the most suitable option due to its flexibility, scalability, and cost-effectiveness, making it ideal for applications with fluctuating traffic and high availability requirements. VPS hosting provides a balanced approach for medium-sized applications that require more control than shared hosting but do not necessitate a dedicated server. Ultimately, the choice of hosting server depends on the specific needs of the project, including budget, performance requirements, and security concerns for Prof Dux expansion project.

FUTURE STUDY

As technology evolves, future research should explore investigation into sustainable and energy-efficient hosting infrastructures will be essential as the demand for eco-friendly data centers grows. Comparative studies on hybrid cloud solutions and their potential to optimize performance and cost for multi-user applications should also be examined to provide a more comprehensive understanding of modern hosting strategies. Additionally, further investigation into sustainable and energy-efficient hosting infrastructures will be essential as the demand for eco-friendly data centers grows.

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